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PROCEEDINGS  
OF THE  
CALIFORNIA ACADEMY OF SCIENCES

FOURTH SERIES

Vol. XXXIII, No. 16, pp. 499-534; 8 figs.; 1 table

July 8, 1966

A REVIEW OF THE GENUS *OPHIOMORUS*  
(SAURIA: SCINCIDAE), WITH DESCRIPTIONS  
OF THREE NEW FORMS

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ABSTRACT: The genus *Ophiomorus* is distributed from mainland Greece through southwest Asia. Three new forms are described herein, and a total of nine species are recognized. The genus contains two major adaptive radiations: the three western species living under rocks and having the greatest limb reduction; the six eastern species inhabiting sand dunes and having the greatest structural modification of the head.

From the morphology of the animals, and from their present geographical distribution, it is speculated that the group originated in the region now occupied by the Plateau of Iran and the mountainous regions of southwest Asia. Morphology and the present pattern of prevailing winds suggest that the sand-dwelling species have been distributed south and east from their center of origin on the Plateau of Iran as a result of dune migration through the agency of wind action.

INTRODUCTION

The genus *Ophiomorus*, a group of very elongate skinks with greatly reduced appendages, is restricted to mainland Greece and southwest Asia. Consequently, the relationships of its species and their distribution are of interest to students of zoogeography of this region. The only previous review of the genus is that of Boulenger (1887b).

Recently, additional specimens of these infrequently encountered lizards have been collected by the Street Expedition of the Chicago Natural History Museum to Iran, by John Gasperetti, and more recently by the Clark Expedition to Afghanistan, by Sherman A. Minton and Jeromie A. Anderson in

Pakistan, and others. This new material has served to elucidate some of the relationships within the genus, and makes possible the recognition of three previously undescribed populations. It seems advantageous to review the entire genus at this time, in the hope of providing a framework for the interpretation of future collections.

An attempt has been made to list all previously recorded localities which can be definitely associated with each species. Those localities which could be located with reasonable certainty are shown on the map (fig. 1).

Measurements and counts for all specimens examined are given in table 1; they are also summarized in the discussions of each of the recognized forms.

Thanks are due Charles M. Bogert and Richard Zweifel of the American Museum of Natural History (AMNH), Doris Cochran and James Peters of the United States National Museum (USNM), Alice G. C. Grandison and E. M. Noble of the British Museum (BM), Robert Inger and Hymen Marx of the Chicago Natural History Museum (CNHM), P. Kuenzer of the Zoologisches Institut und Museum der Universität Göttingen (MUG), Ernest E. Williams of the Museum of Comparative Zoology, Harvard University (MCZ), and Ilja Darevsky, Zoological Institute, Academy of Sciences, Leningrad (ZIL) for permission to examine specimens in their care. We particularly want to thank Jeromie A. Anderson for collecting the new species from west Pakistan at our request. Specimens in the collection of the California Academy of Sciences are designated with the letters CAS.

Maurice Giles of the California Academy of Sciences kindly prepared the photographs.

### Genus *Ophiomorus* Duméril and Bibron

*Ophiomorus* DUMÉRIL and BIBRON, 1839, Erp. Gen., vol. 5, p. 799 (type species, *O. miliaris*)

Duméril and Bibron, by monotypy [= junior objective synonym of *Anguis punctatissimus* Bibron and Bory St. Vincent, 1833].

*Sphenocephalus* (nec Agassiz, 1838) BLYTH, 1853, J. Asiatic Soc. Bengal, vol. 22, p. 654 (type species *S. tridactylus* Blyth, by monotypy).

*Hemipodion* STEINDACHNER, 1867, Sitzb. Akad. Wiss. Wien, vol. 55, p. 265 (type species *H. persicum* Steindachner, by monotypy).

*Zygnopsis* BLANFORD, 1874, Ann. Mag. Nat. Hist., ser. 4, vol. 14, p. 33 (type species *Z. brevipes* Blanford, by monotypy).

*Sphenoscincus* PETERS, 1875, Monatsb. Akad. Wiss. Berlin, 1875, p. 553 (type species *Sphenocephalus tridactylus* Blyth, by monotypy).

*Zygnidopsis* BLANFORD, 1879, J. Asiatic Soc. Bengal, vol. 48, p. 128 (proposed as a corrected spelling of *Zygnopsis* Blanford, 1874; type species *Zygnopsis brevipes* Blanford, 1874, by reason of its proposal as a substitute name [spelling]).

Palatine bones not meeting on the midline of the palate; pterygoid teeth

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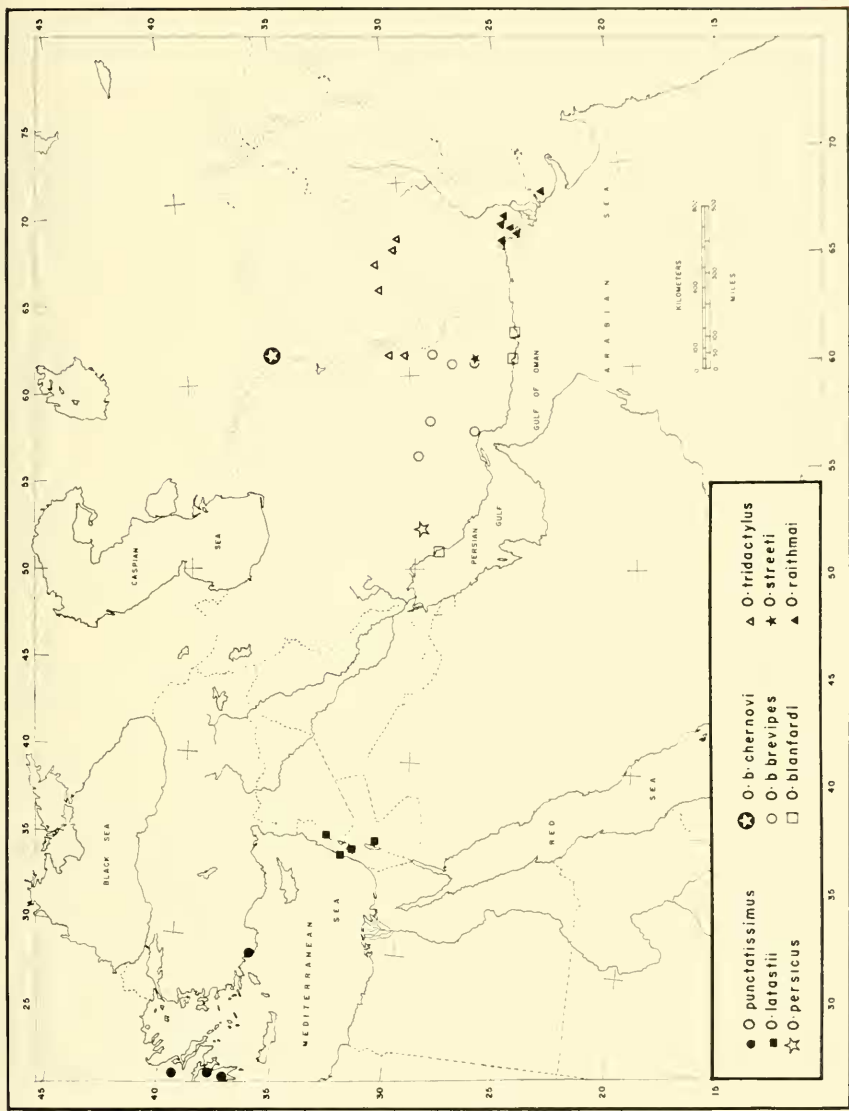


FIGURE 1. Map of southwest Asia showing distribution, based on available locality records, of the currently recognized species of *Ophiomorus*.

usually present. Teeth conical, or with obtuse crowns. Eye small; lower eyelid with an undivided, transparent disc. Ear opening absent or hidden. Nostril in the suture between the nasal and supranasal, close to the rostral; prefrontals

usually distinct; frontoparietal and parietal distinct. Body elongate. Limbs greatly reduced or absent.

RANGE. From Greece through southwest Asia to northwestern India.

REMARKS. There are two major adaptive trends within the genus. One group, consisting of the three westernmost species, *Ophiomorus persicus*, *O. punctatissimus*, and *O. latastii*, have extremely elongate cylindrical bodies and blunt, conical snouts. The peritoneum and mesenteries are darkly pigmented. In *O. punctatissimus* and *O. latastii* the limbs have been lost entirely, while in *O. persicus* they are greatly reduced. Judging from their morphology and the little that is known of their habits, they are adapted to living under rocks, and perhaps burrowing in loose soil. The remaining species are adapted to living in loose windblown dune sand, moving through this medium with strong lateral undulations. This mode of locomotion has earned them the appellation "sand-fish" in some areas, a name also applied to members of the genus *Scincus*. Their wedge-shaped snouts, elongate body form, extremely smooth imbricate scales, prominent ventrolateral edge to the body from snout to groin, and the small grooves into which fit the forelimbs during subsurface locomotion, are adaptations which facilitate their progress through loose sand. The peritoneum and mesenteries of these species are devoid of dark pigment.

*Ophiomorus punctatissimus* and *O. latastii* retain external ear openings (hidden by scales), while *O. persicus*, in most respects the least specialized member of the genus, lacks them, as do all of the sand-dwelling forms.

All of the species exhibit sexual dimorphism in the number of dorsal scales, the females having a higher count than the males of the same species.

In using the number of longitudinal scale rows as a character for distinguishing populations of *Ophiomorus*, it is essential that the position on the body at which the counts are made be constant. This is because of the fact that reduction of the number of scale rows takes place as body circumference decreases posteriorly. The positions of reduction are relatively constant within a population, but vary from one population to another. An expanded discussion of scale row reduction in the Scincidae is planned for a later date. For purposes of the diagnoses and key used in this paper, mid-body counts are made at a point exactly halfway between the vent and the end of the snout. Table 1 also includes counts made at one-third and two-thirds the distance from snout to vent.

The genus *Ophiomorus* appears to be related most closely to the genera *Eumeces*, *Scincus*, and *Chalcides*. The relationships among these genera await further study. Neither *Scincus*, with its highly modified snout and fringed digits, nor *Chalcides*, with its greater modification of the head shields, appears representative of a type directly ancestral to *Ophiomorus*.

KEY TO THE SPECIES OF THE GENUS *OPHIOMORUS*

- 1a. Limbs absent; scale rows less than 20 at mid-body.<sup>1</sup>
- 2a. Small prefrontals present; frontonasal half, or less than half as long as the frontal; scale rows 18 at posterior third of body ..... *O. punctatissimus*
- 2b. No prefrontals; frontonasal much more than half as long as the frontal; scale rows 16 at posterior third of body ..... *O. latastii*
- 1b. Limbs present; scale rows 20 or more at mid-body.
- 3a. Fingers 4, toes 3.
- 4a. Scale rows 20 at mid-body ..... *O. blanfordi*
- 4b. Scale rows more than 20 at mid-body.
- 5a. Scale rows 22 at mid-body ..... *O. brevipes*
- 5b. Scale rows 24 at mid-body ..... *O. chernovi*
- 3b. Fingers 3; toes 2 or 3.
- 6a. Toes 2 ..... *O. persicus*
- 6b. Toes 3.
- 7a. Parietals in contact posteriorly. Prefrontals not in contact with upper labials (20 scale rows at mid-body) ..... *O. streeti*
- 7b. Parietals not in contact behind interparietal; prefrontals in contact with upper labials; usually 22 scale rows at mid-body (occasionally 20).
- 8a. Parietal in contact with anterior temporal; postocular scale about as large as posterior suboculars; usually 7 or 8 scales on third (longest) toe ..... *O. tridactylus*
- 8b. Parietal not in contact with anterior temporal (posterior temporal intervenes); postocular scale much larger than posterior suboculars; usually 4 to 6 scales on third (longest) toe ..... *O. raithmai*

*BREVIPES* GROUP*Ophiomorus chernovi*<sup>2</sup> Anderson and Leviton, new species.

(Figures 2a, 2b, 3a.)

*Ophiomorus brevipes* BOULENGER, 1891, Proc. Zool. Soc. London, p. 631. Nikolsky, 1899, Fedtschenko's Reise in Turkestan, vol. 2, p. 44; 1915 (in part). Faune de la Russie, vol. 1, pp. 515-516, fig. 69. TEREHTJEV and CHERNOV, 1949, Diag. Rept. Amph., pp. 174-175, map 25. BOGDANOV, 1962, Presm. Turkmen, p. 106.

DISTRIBUTION. Known only from the type locality, in Turkmen, near the Iranian and Afghan borders.

HOLOTYPE. British Museum number 91.10.6.25, Turkmen: Pul-i-Khatun, at confluence of Geshef-Rud and Hari-Rud, collected by M. C. Eylandt, 1891.

PARATYPES (6). BM 91.10.6.24, 91.10.6.26-91.10.6.27, 91.10.6.29. CAS 100806, same data as holotype; BM 1940.2.24.23, same locality data as holotype, collected by P. Nesteroff, 1940.

DIAGNOSIS. Snout cuneiform, a slight labial edge; interparietal broader than long. Twenty-four scales round the middle of the body. Fingers four; toes three.

<sup>1</sup> Counts must be made exactly midway between snout and vent.

<sup>2</sup> This form is named for the late Dr. S. A. Chernov, former Curator of Herpetology in the Zoological Museum at Leningrad, in recognition of his numerous contributions to the herpetology of the USSR.

TABLE 1. *Counts and measurements of material examined of Ophiomorus.*

Species	Museum Number	Sex	Length		1	Scale Rows <sup>3</sup>			
			S-V	Tail		2	3	4	5
<i>O. blanfordi</i>	BM 91.9.14.5	♀	83	— <sup>4</sup>	102	22	20	20	
"	CNHM 43437	♀	96	—	103	21	20	20	
"	USNM 148660	juv	49	42	96	22	20	20	
"	MUG 83	— <sup>5</sup>	50 <sup>6</sup>	—	100	22	20	20	
"	MUG 85	—	48 <sup>6</sup>	—	102	22	20	20	
<i>O. brevipes</i>	CAS 86593	♂	76	—	107	24	22	22	
"	CNHM 141548	♀	85	78	110	24	22	22	
"	CNHM 141549	♀	80	89	112	24	22	22	
"	CNHM 141550	♀	91	—	114	22	22	22	
"	CNHM 141552	♂	82	—	106	24	22	22	
"	CAS 101792	♀	83	—	112	24	22	22	
<i>O. chernovi</i>	BM 91.10.6.24	juv	54	—	116	24	24	22	
"	BM 91.10.6.25 <sup>7</sup>	♀	91	—	118	25	24	23	
"	BM 91.10.6.26	juv	62	—	115	25	24	22	
"	BM 91.10.6.27	♀	95	—	115	25	23	23	
"	CAS 100806	♀	90	—	113	25	24	22	
"	BM 91.10.6.29	♂	87	—	109	25	23	22	
"	BM 1940.2.24.23	♀ (?)	84	—	112	24	24	22	
<i>O. latastii</i>	CAS 87417	♂	102	—	117	18	16	16	
"	CNHM 74419	♀	81	—	121	18	16	16	
"	AMNH 88382	♀	96	—	122	18	16	16	
<i>O. persicus</i>	CNHM 141555	♀	75	—	120	22	20	20	
"	CAS 101793	♂	68	—	122	22	20	20	
"	CNHM 141557	♀	75	—	122	22	20	20	
"	CAS 101794	♀	75	—	119	22	20	20	
"	CNHM 141559	♂	61	—	112	22	20	20	
"	CNHM 141560	♀	73	80	121	22	20	20	
"	CNHM 141561	♀	79	—	122	22	20	20	
"	CAS 101795	♂	72	—	114	22	20	20	
"	CNHM 141563	♂	66	83	113	22	20	20	
"	CAS 101796	♀	82	—	120	22	20	20	
"	CNHM 141565	♀	80	—	124	20	20	20	
"	CAS 101797	♂	69	—	117	22	20	20	
"	CNHM 141577	♂	56	—	115	22	20	20	
"	CNHM 141578	juv	41	—	116	22	20	20	
"	CNHM 141579	♀	77	—	118	22	20	20	
"	CNHM 141580	♂	60	—	114	22	20	20	
"	CAS 101798	juv	46	—	113	22	20	20	
"	CNHM 141582	♀	78	—	121	22	20	20	
<i>O. punctatissimus</i>	CAS 12752	♀	50	—	113	20	18	18	

<sup>3</sup> Categories of scale rows are as follows:

1) Number of transverse rows of dorsal scales from parietals to level of vent.

2) Number of longitudinal scale rows around anterior third of body.

3) Number of longitudinal scale rows around mid-body.

4) Number of longitudinal scale rows around posterior third of body.

<sup>4</sup> Tail regenerated, damaged, or largely missing; presence of dash (—) indicates no measurements taken.

<sup>5</sup> Specimen poorly preserved, presence of dash (—) indicates it could not be sexed.

<sup>6</sup> Specimen poorly preserved and could not be measured properly; these measurements are approximations.

<sup>7</sup> Holotype.

TABLE 1. *Continued.*

Species	Museum Number	Sex	Length		1	Scale Rows <sup>8</sup>			
			S	V		2	3	4	
"	USNM 31956	♂	72	79	105	20	18	18	
"	USNM 37299	♂	77	—	102	20	18	18	
"	AMNH 17819	♂	53	55	102	20	18	18	
"	MCZ 25933	♂	76	80	107	20	20	18	
"	MCZ 38517	♂	67	—	105	20	18	18	
<i>O. railhmai</i>	CAS 99835	♀	99	—	112	22	22	22	
"	CAS 99834 <sup>7</sup>	♂	83	—	107	22	22	22	
"	CAS 99836	♀	81	66	114	22	22	22	
"	CAS 99838	♂	85	—	107	22	22	22	
"	CAS 99840	♂	65	—	110	22	22	22	
"	CAS 99841	♀	70	—	111	22	22	22	
"	CAS 99842	♀	63	—	111	22	22	22	
"	CAS 99843	♀	65	55	111	22	21 <sup>8</sup>	20	
"	CAS 99844	} specimens living at time of this report.							
"	CAS 99845								
"	CAS 99846								
"	MCZ 84027	♀	90	—	113	22	22	22	
"	ZIL	♀	89	—	111	22	22	22	
"	BM 70.11.29.39	—	76	—	106	22	22	20	
"	BM 70.11.29.39A	—	76	—	106	21	22	22	
"	BM 70.11.29.39B	—	64	—	109	22	22	22	
"	BM 70.11.29.39C	—	66	—	109	22	22	22	
"	BM 1934.3.4.3	♀	74	54	113	22	22	22	
"	BM 1934.3.4.4	♀	84	—	113	22	22	22	
"	AMNH 82205	♂	81	—	107	22	22	22	
"	AMNH 85843	♂	84	—	108	22	22	22	
"	AMNH 85844	—	—	—	—	—	22	—	
"	AMNH 85845	♂	78	—	105	22	22	22	
"	AMNH 85846	♀	81	64	111	22	22	22	
"	AMNH 85847	♀	90	—	111	21	20	20	
"	AMNH 85848	♂	64	—	107	22	22	22	
"	AMNH 86876	♀	94	—	112	22	22	22	
"	AMNH 86877	juv	44	—	113	22	22	22	
"	AMNH 86878	juv	40	—	102	22	22	22	
"	AMNH 86879	♀	90	—	111	22	22	22	
"	AMNH 86880	♀	76	—	110	23	22	22	
<i>O. streeti</i>	CAS 100024	♀	90	—	112	22	20	20	
"	CNHM 141551 <sup>7</sup>	♀	85	—	109	20	20	20	
<i>O. tridactylus</i>	CAS 84669	♂	91	—	114	22	22	22	
"	CAS 84670	♀	84	—	115	22	22	22	
"	CAS 84671	♂	79	54	107	22	22	22	
"	CAS 84672	♀	76	—	114	22	22	22	
"	CAS 84673	♂	80	61	114	22	22	22	
"	CAS 84674	♂	83	66	101	22	22	22	
"	CAS 84675	♂	71	—	114	22	22	22	

<sup>8</sup> Owing to fusion of two scales.

TABLE 1. *Continued.*

Species	Museum Number	Sex	Length		1	Scale Rows <sup>3</sup>		
			S-V	Tail		2	3	4
"	CAS 97973	♂	81	—	110	22	22	22
"	AMNH 74578	♂	78	—	112	24	22	22
"	AMNH 75607	—	92	—	122	22	22	22
"	AMNH 75608	—	—	—	118	—	22	—
"	AMNH 75609	—	—	—	120	—	22	—
"	AMNH 75610	—	—	—	118	—	22	—
"	AMNH 75611	—	—	—	115	—	22	—
"	AMNH 77109	♂	84	—	113	22	22	22
"	BM 68.4.3.71	♀	88	—	113	22	22	22
"	BM 1936.9.11.1	♀	87	—	118	22	22	22
"	CNHM 141376	♀	85	—	121	22	22	22
"	CNHM 731	♀	88	—	116	22	22	22
"	MCZ 13963	♂	91	—	113	20	20	21

Color as in *Ophiomorus brevipes*.

DESCRIPTION OF HOLOTYPE. Head depressed; snout cuneiform, with a distinct, but rounded, labial edge; mouth inferior. Rostral with a triangular, convex, superior portion equal in length to two-thirds the width, the inferior portion not concave, lying entirely in front of the mouth, and equal in length to about two-fifths the width; the posterior angle of the rostral does not partially separate the supranasals, which are broadly in contact; frontonasal septagonal, about two-thirds as long as broad, twice as long as the suture formed by the supranasals; frontal ten-sided, longer than broad, as long as the distance between its anterior border and the tip of the snout; interparietal broader than long, three-fourths as long as frontal, its straight anterior border forming a broad suture with the straight posterior border of the frontal; a pair of elongate parietals, less than one-third as broad as long, obliquely situated, as long as the distance between eye and nostril, and not in contact behind the interparietal; a single enlarged nuchal on each side of the midline. Nostril in the suture between the nasal and the supranasal, separated from the rostral; nasal more than three-fourths the length of the supranasal, much longer than high, truncate behind; supranasal longer than broad; prefrontals pentagonal, much longer than broad, pointed behind, broadly separated from the supralabials by the loreal and the preocular, broadly separated from one another by the suture formed by the frontal and frontonasal; loreal longer than high, higher than the preocular, which is also longer than high, and is as long as the loreal; three supraoculars, the second largest; two small frontoparietals, widely separated from one another, and much larger than the postocular; five elongate supra-ciliaries on the right, six on the left; upper eyelid rudimentary; lower lid with a large transparent scale, surrounded by several much smaller scales; a small postocular, about equal to the posterior suboculars; temporals 1 + 3, the anterior



highest, the upper posterior longest, the anterior and two upper posterior temporals in contact with the parietal. Eight supralabials, the 5th and 6th below the eye, the 5th much the longest, the 1st and 8th much the smallest. No ear opening.

Mental quadrangular, with a straight posterior border; two azygous postmentals, the posterior the larger, and irregular in this specimen, being excluded from contact with the infralabials on the left side by the intervention of the first left submaxillary shield; four enlarged submaxillaries on the right, five on the left, bordering the infralabials. Seven infralabials on the right, six on the left.

Body very elongate, the ventrolateral edge not sharply defined. Length of hind limb goes slightly more than four times into distance between axilla and groin. All scales of body perfectly smooth, imbricate, more than twice as broad as long. Twenty-four longitudinal straight series of scales round the middle of the body (measured halfway between tip of snout and vent); 25 round the body counted exactly one-third the distance from snout to vent, 23 at two-thirds the distance from snout to vent; 118 scales between interparietal and the level of the vent. A pair of enlarged preanal scales.

Tail slightly depressed, scales subequal to those of body; a median subcaudal series of slightly enlarged scales.

Forelimb about two-thirds length of hind limb; four fingers, the one on ulnar side shortest, the two middle fingers nearly equal, the outer slightly the longer; seven lamellae beneath the longest finger, four beneath the shortest on the right hand, three beneath the shortest on the left.

Three toes, the toe of the tibial side the shortest, less than half the length of the toe of the fibular side, which is longer than the middle toe. Ten lamellae beneath the longest toe, eight scales on the outer aspect; four lamellae under the shortest toe, six under the middle toe. All fingers and toes clawed.

Color (in alcohol) cream above, each scale of the two median dorsal rows with a brown spot, these forming two distinct lines the length of the body and tail. The scale rows immediately lateral to these median rows lack dark markings, except for a few occasional scattered faint dots. The next three lateral rows each with a dark marking on each scale, forming three lines in such close approximation as to appear as a single broad stripe the length of the body. Immaculate cream below. A dark line from nostril through eye and temporal region, contacting lateral stripe on body. A single dark line on frontonasal and anterior portion of frontal, bifurcating on posterior part of frontal and on interparietal; a dark dot on posterior part of interparietal. Limbs speckled with brown on dorsal surfaces.

MEASUREMENTS OF HOLOTYPE. Snout-vent: 91; tail: 63 (terminal two-fifths regenerated); head (tip of snout to angle of jaw): 8; hind limb: 16; eye (opening between lids): 2; snout (tip of snout to orbit): 4.

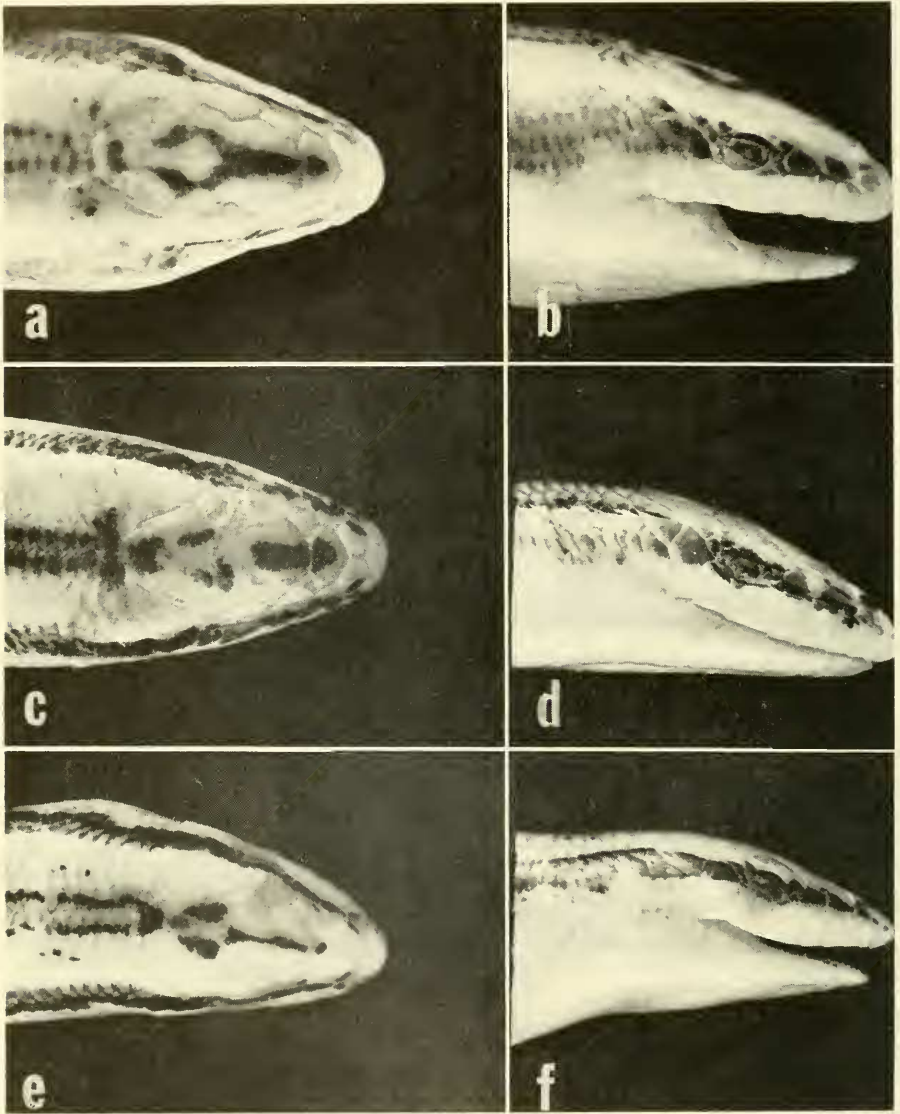


FIGURE 2. "Brevipes" group of the genus *Ophiomorus*; dorsal and lateral views of head: a and b) *O. chernovi*; c and d) *O. brevipes*; e and f) *O. blanfordi*.

REMARKS. This form differs from *Ophiomorus brevipes* in possessing a greater number of longitudinal scale rows. Of all material of *Ophiomorus* examined, this population is the most variable in the positions on the body at which scale row reduction takes place, both as regards different individuals and the two sides of the same animal. For example, in BM 91.10.6.27 the

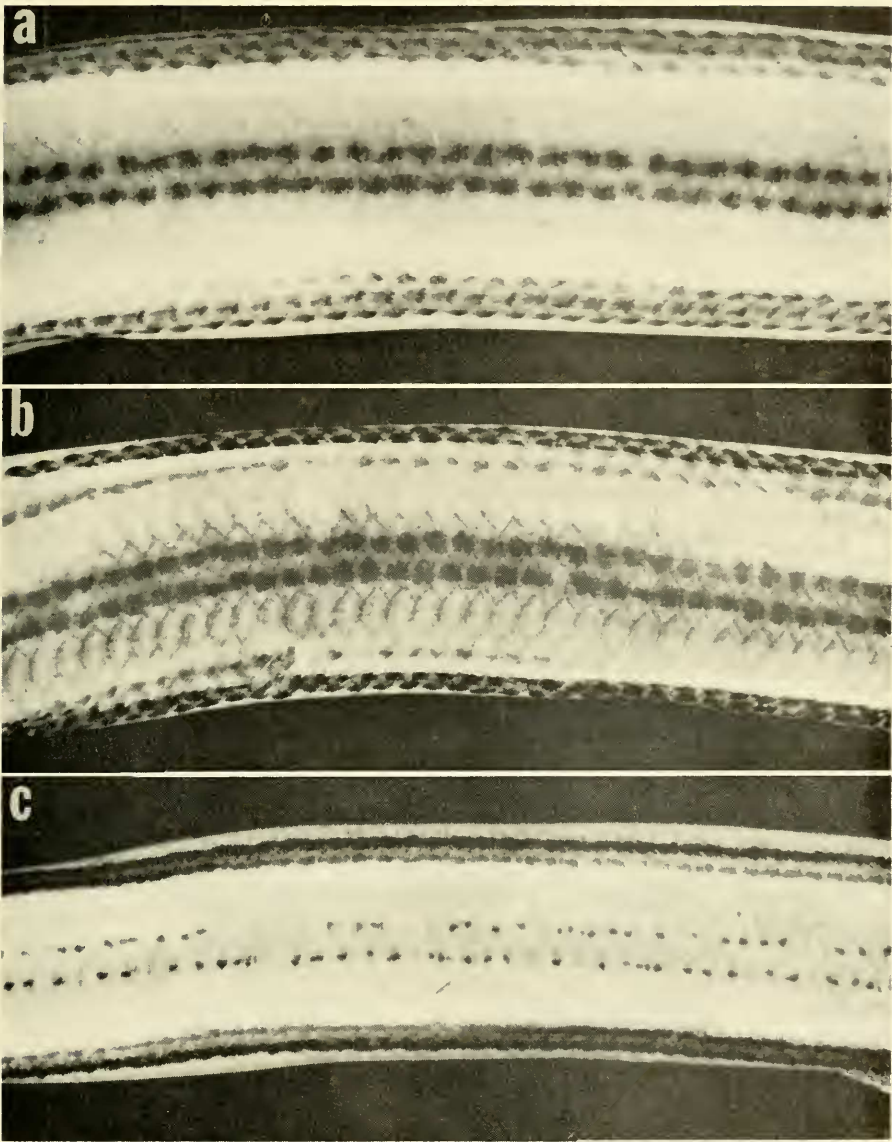


FIGURE 3. "Brevipes" group of the genus *Ophiomorus*; mid-body sections showing typical color patterns: a) *O. chernovi*; b) *O. brevipes*; c) *O. blanfordi*.

count drops from 24 scale rows to 23 anterior to mid-body, but the full reduction to 22 occurs only in the posterior third of the body. There is also a greater tendency to fusion of the head shields; BM 91.10.6.29 has complete fusion of the right prefrontal with the frontal; BM 1940.2.24.23 has the frontal partially

fused with the frontonasal. In BM 91.10.6.24 the postocular is enlarged and elongated, interposed between the anterior temporal and the parietal in such a way that these latter scales are not in contact. Whether this greater variability is a reflection of genetic or developmental diversity cannot be determined from this material, of course. The fact that this is the most northern population of this species known, presumably living in a colder environment than the other populations examined, suggests that perhaps developmental differences account for the observed variation.

Snout-vent length (mm.): ♂: 87; ♀: 84-95; dorsal scales from occipital region to a point at the level of the vent: ♂: 109; ♀: 112-118 (mean 114.5).

BM 91.10.6.27 contains ovarian eggs, the largest approximately 2 mm. in diameter.

*Ophiomorus brevipes* (Blanford).

(Figures 2c, 2d, 3b.)

*Zygnopsis brevipes* BLANFORD, 1874, Ann. Mag. Nat. Hist., ser. 4, vol. 14, p. 33 (type locality: Iran: Sáadatabad, southwest of Kerman); 1876, Eastern Persia, vol. 2, Zool. and Geol., pp. 397-399, pl. 27, fig. 4.

*Ophiomorus brevipes* BOULENGER, 1887, Cat. Lizards British Mus., vol. 3, pp. 395-396; 1887, Bull. Soc. Zool. France, vol. 12, pp. 525-526. NIKOLSKY, 1899, Ann. Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 4, pp. 401-402; 1915 (in part), Faune de la Russie, vol. 1, pp. 515-516, fig. 69. SMITH, 1935, Fauna British India, vol. 2, p. 348. WERNER, 1936, Festschrift Strand, vol. 2, p. 201. FORCART, 1950, Verh. Naturf. Ges. Basel, vol. 61, p. 148. WETTSTEIN, 1951, Sitzber. Österr. Akad. Wiss. Mathem.-Natur. Wien, vol. 160, p. 441. ANDERSON, 1963, Proc. California Acad. Sci., ser. 4, vol. 31, pp. 464-465, fig. 13.

DISTRIBUTION. Sandy regions of eastern Iran.

KNOWN LOCALITIES. IRAN: Sáadatabad, between Kerman and Shiraz, about 100 miles southwest of Kerman, 29°40' N., 55°51' E., 5,500 ft. elevation (Blanford, 1874, type locality); Kirman (Nikolsky, 1915); Schur (Sargad) (Nikolsky, 1915); Bazman, 27°49' N., 60°12' E. (Nikolsky, 1915); Kuh-i-Tuftan, 28°36' N., 61°06' E. (Nikolsky, 1915); Kerman Province; between Zahedan and Chahbar (Forcart, 1950); Sabzavaran, 28°37' N., 57°45' E. (Wettstein, 1951); Minab, 27°09' N., 57°07' E. (Anderson, 1963); 11 miles west of Iranshahr, 27°12' N., 60°30' E.

MATERIAL EXAMINED (6). CAS 86593, Iran: Minab, collected by Steven C. Anderson, October 21, 1958. CNHM 141548-141550, 141552-141553, Iran: 11 miles west of Iranshahr, collected by the Street Expedition to Iran, November 27-December 4, 1962.

DIAGNOSIS. Snout cuneiform, a slight labial edge; interparietal broader than long. Twenty-two scales round the middle of the body. Fingers four; toes three.

Cream or pale brown above in preservative, each scale of the two median dorsal rows with a central brown spot, these forming two distinct lines the

length of body and tail. The scale rows immediately lateral to these median rows lack dark markings. The next three lateral rows each with a dark marking on each scale, forming either three distinct lateral stripes, or a single broad stripe the length of body and tail. Immaculate white below. A dark line from nostril through eye and temporal region, contacting lateral stripes on the body. A single line on frontonasal and frontal, divided on posterior portion of frontal, reuniting on posterior portion of interparietal.

REMARKS. In *Ophiomorus brevipes* the interparietal is considerably broader than long, and the frontonasal is approximately twice as broad as long.

Smith (1935) says that the dark longitudinal lines occupy 10 dorsal scale rows. In all of the specimens examined here, the second dorsal scale row on either side of the vertebral line is without a dark line. Occasionally there are scattered dark spots on a few of the scales of this row.

Snout-vent length (mm.): ♂: 76-82; ♀: 80-91; dorsal scales from the occipital to a point level with the vent: ♂: 106-107 (mean 106.5); ♀: 110-114 (mean 112).

The following specimens contain ovarian eggs: CNHM 141548, 141549, 141553, the largest egg slightly less than 2 mm. in diameter.

*Ophiomorus brevipes* is intermediate in the number of longitudinal scale rows and in its geographical distribution between *O. chernovi* and *O. blanfordi*.

### *Ophiomorus blanfordi* Boulenger.

(Figures 2e, 2f, 3c.)

*Zygnidopsis brevipes* BLANFORD, 1879, J. Asiatic Soc. Bengal, vol. 48, p. 128 (type locality: southern Persia or Baluchistan, here restricted to Iran: Baluchistan: Chah Bahar, 25°18' N., 60°37' E.).

*Ophiomorus blanfordi* BOULENGER, 1887, Cat. Lizards British Mus., vol. 3, p. 395, pl. 33, fig. 1; 1887, Bull. Soc. Zool. France, vol. 12, pp. 523-525. WERNER, 1917, Verh. k. k. Zool.-Bot. Ges. Wien, p. 203. SMITH, 1935, Fauna British India, vol. 2, pp. 347-348. WERNER, 1936, Festschrift Strand, vol. 2, p. 201. SHOCKLEY, 1949, Herpetologica, vol. 5, pp. 121-123. NEILL, 1958, Bull. Mar. Sci. Gulf and Caribbean, vol. 8, pp. 1-97. SCHMIDT and INGER, 1957, Living Reptiles of the World, p. 132. ANDERSON, 1963, Proc. California Acad. Sci., ser. 4, vol. 31, p. 476.

DISTRIBUTION. Coastal sand dunes of southern Iran and West Pakistan.

KNOWN LOCALITIES. Southern Iran or West Pakistan (Blanford, 1879). IRAN: *Fars Province* (Werner, 1917); *Baluchistan*: Chah Bahar, 25°18' N., 60°37' E. (here designated as type locality). PAKISTAN: Ras Jiunri (=Jiwani), 10 air miles east of Iranian border, on the coast (Shockley, 1949).

MATERIAL EXAMINED (5). USNM 148660, Iran: Baluchistan: Chah Bahar, collected by Ranck and Herman. CNHM 43437, Pakistan: Ras Jiunri, 10 air miles east of Iranian border, collected by Clarence H. Shockley, October 1-7.

1945. BM 91.9.14.5, Baluchistan?, collected by W. T. Blandford. MUG 83, 85, Iran: Fars Province, collected by Andreas, 1905.

DIAGNOSIS. Snout cuneiform, with angular labial edge; interparietal as long as broad; frontonasal not twice as long as broad. Twenty scales round the middle of the body. Fingers four; toes three.

Cream or pale brown above in preservative, the two median dorsal scale rows with scattered dark spots, forming more or less distinct longitudinal lines; the scale rows immediately lateral to these median dorsal rows without dark markings; the third and fourth rows from the vertebral line with dark brown dots forming well-marked lines which extend forward along sides of head. Top of head with or without a central dark streak.

REMARKS. We have examined two of the three specimens recorded by Werner (1917). They agree in every respect with the specimens from southeastern Iran. The locality on the labels is simply "Persien." Supposedly, all of Prof. Andreas' material was collected in Fars Province. Werner fails to cite any locality for these specimens. Several specimens of other reptiles collected by Andreas were reported by Werner as coming from the vicinity of Bushire, and it seems not unlikely that the specimens of *Ophiomorus blanfordi* also came from this region, probably from the coastal dunes. This form will likely be found in the dunes along the coast between Bushire and the nearest eastern locality, Chah Bahar.

Nikolsky (1899) felt that *O. blanfordi* was probably a variety of *O. brevipes*. While his specimens listed as *O. brevipes* had 22 scales round the body, the "prefrontal" (=frontonasal) was as long as wide, as is the case in *O. blanfordi*. In the material at hand, the frontonasal is approximately as long as broad, or slightly broader than long in *O. blanfordi*, while in *O. brevipes* it is approximately twice as broad as long.

Because *O. blanfordi* differs from *O. brevipes* not only in the number of scale rows, but also in the proportion of the head scales and in the color pattern, its status as a species is here retained. Its nearest ally is *O. brevipes*.

#### TRIDACTYLUS GROUP

*Ophiomorus streeti*, Anderson and Leviton, new species.

(Figures 4a, 4b, 5a.)

HOLOTYPE. Chicago Natural History Museum 141551, ♀, Iran: Baluchistan: 11 miles west of Iranshahr; collected by W. S. Street, J. K. Street, and Douglas M. Lay, November 27–December 4, 1962.

PARATYPE. CAS 100024, ♀, same data as holotype.

DIAGNOSIS. Snout cuneiform, with sharp angular labial edge; supranasals broadly in contact medially; prefrontals not in contact with upper labials; frontonasal longer than broad. Twenty scales round the middle of the body. Fingers three; toes three.

Cream above in preservative, each scale of the eight dorsal rows with a dark brown spot, these forming eight longitudinal lines extending from the posterior head shields to the level of insertion of the hind limbs; posteriorly six lines continue onto tail. Venter and sides immaculate white.

**DESCRIPTION OF HOLOTYPE.** Head depressed; snout cuneiform, with sharp angular labial edge; mouth inferior. Rostral with a triangular, convex, superior portion equal in length to two-thirds the width, the inferior portion slightly concave, lying entirely in front of the mouth, and equal in length to about two-fifths the width; the obtuse posterior angle of the rostral does not partially separate the supranasals; frontonasal septagonal, three-fourths as broad as long, twice as long as the suture formed by the supranasals; frontal ten-sided, broader than long, as long as the distance between its anterior border and the apex of the rostral; interparietal broader than long, longer than the frontal, and as broad as the frontal, its straight anterior border forming a broad suture with the straight posterior border of the frontal; a pair of elongate, curved parietals, about one-third as broad as long, obliquely arranged, meet behind the interparietal to form a short suture; two enlarged nuchal shields on the left, three on the right. Nostril in the suture between the nasal and the supranasal, narrowly separated from the rostral; nasal three-fourths the length of the supranasal, as high as long, and pointed behind; supranasal longer than broad; prefrontals quadrangular, acutely pointed behind, about three-fifths as broad as long, broadly separated from the supralabials by the loreal and the preocular, broadly separated from one another by the suture formed by the frontal and frontonasal; loreal as high as long, higher than the preocular, which is half again as long as high, and longer than the loreal; three small supraoculars, the anterior two larger than the posterior; a small shield interposed between the frontal and the suture formed by the 1st and 2nd supraoculars; two small frontoparietals, widely separated from one another, and slightly larger than the postocular; four elongate supraciliaries; upper eyelid rudimentary; lower lid with a large transparent scale and 13 much smaller scales (the right side of the head is somewhat mutilated, and the exact number of scales in the lower lid cannot be determined); a single postocular, much larger than the posterior suboculars; two large temporals, the anterior higher, the posterior longer, both bordering the parietals. Seven supralabials, the 5th and 6th below the eye, the 5th much the longest, the 1st much the smallest, the 7th much smaller than the 6th, and lying below the anterior temporal. No ear opening.

Mental quadrangular, the posterior border concave; two azygous postmentals, the posterior much the larger; a series of four enlarged shields on either side of the chin, bordering the infralabials. Seven infralabials.

Body very elongate, with distinct ventrolateral edge, which continues the labial angulation to the groin. Length of hind limb goes slightly more than five

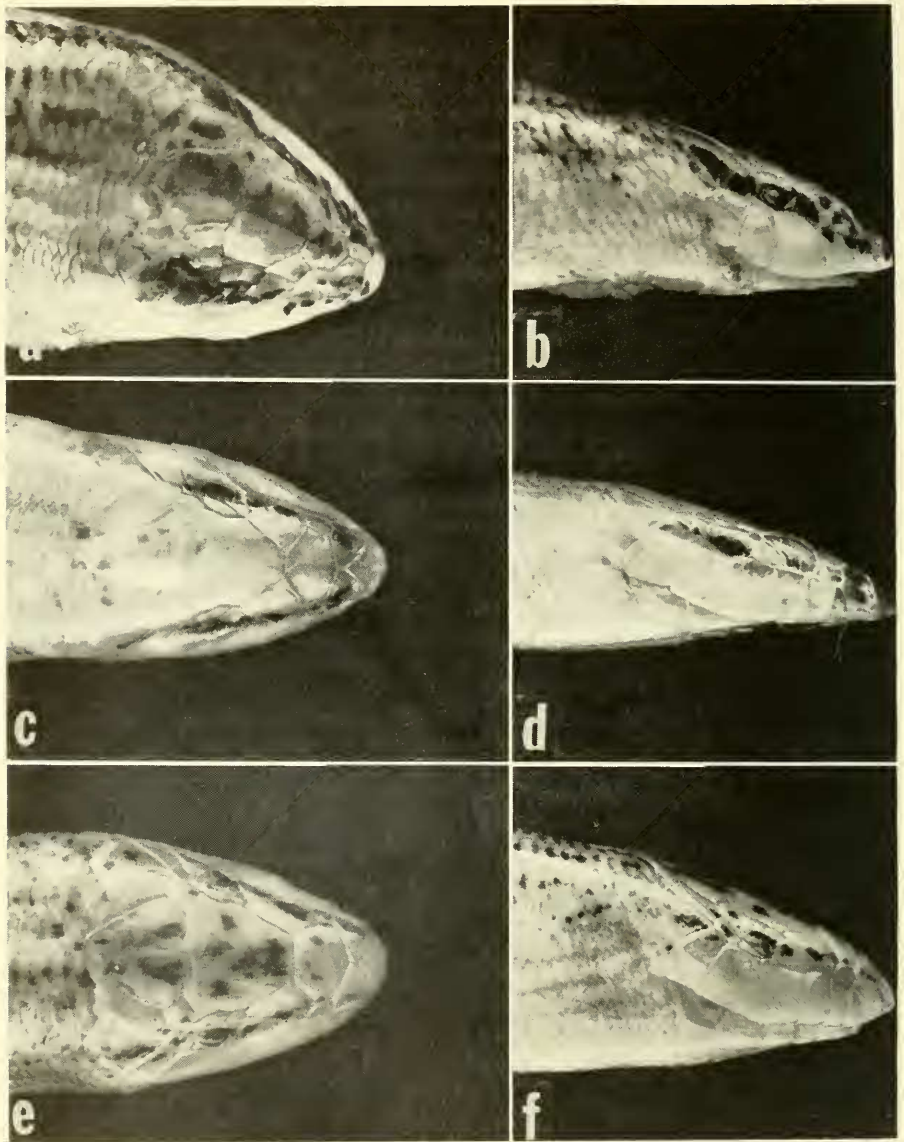


FIGURE 4. "Tridactylus" group of the genus *Ophiomorus*; dorsal and lateral views of head: a and b) *O. streeti*; c and d) *O. tridactylus*; e and f) *O. raithmai*.

times into distance between axilla and groin. All scales of body perfectly smooth, imbricate, more than twice as broad as long. Twenty longitudinal, straight series of scales round the body; 109 scales between the parietals and a line drawn at the level of the vent. A pair of enlarged preanal scales.



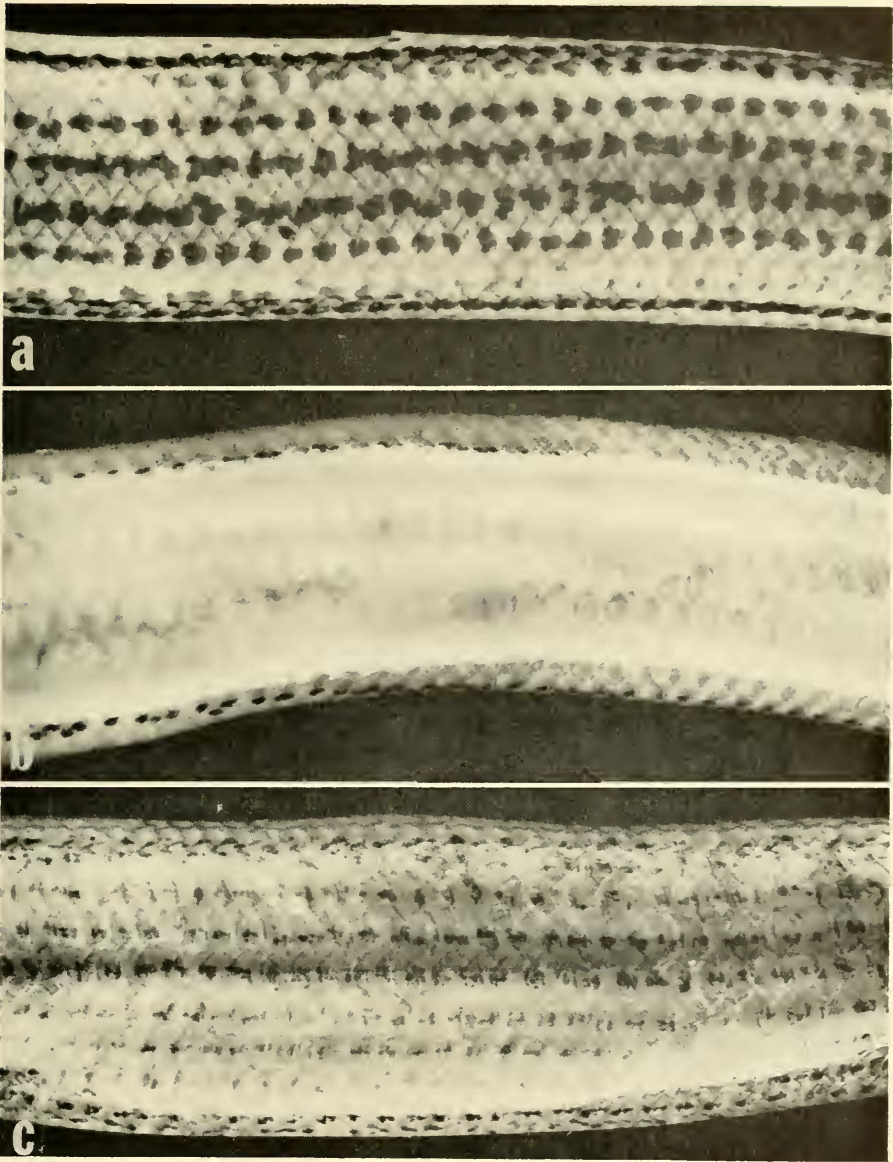


FIGURE 5. "Tridactylus" group of the genus *Ophiomorus*; mid-body sections showing typical color patterns: a) *O. streeti*; b) *O. tridactylus*; c) *O. raithmai*.

Tail slightly depressed, scales subequal to those of body; a median sub-caudal series of slightly enlarged scales.

Forelimb less than one-half length of hind limb; three fingers, the one on

the radial side shortest, that of the ulnar side very slightly larger than the middle one; six lamellae beneath the longest finger, two beneath the shortest, five beneath the middle finger.

Three toes, the toe of the tibial side the shortest, slightly more than one-half the length of the toe of the fibular side, which is longer than the middle toe. Eleven lamellae under the longest toe, seven scales on lateral aspect, four lamellae under the shortest toe, seven under the middle toe. All fingers and toes clawed.

Color (in alcohol) cream above, each scale of the eight dorsal rows with a dark brown spot, these forming eight longitudinal lines of discrete spots extending from the posterior head shields to the tip of the tail. Venter and sides immaculate white. Upper surface of hind limb with dark brown dots. Dark brown markings on rostral, nasals, upper labials, loreals, postocular, and temporals, forming a line through the eye. Each upper head shield with a rather irregular dark mark.

MEASUREMENTS (in mm.). *Holotype*: snout-vent: 84; tail: 53 (terminal one-fourth regenerated); head (tip of snout to angle of jaw): 10; hind limb: 14; eye (opening between lids): 1.0; snout (tip of snout to orbit): 4.

*Paratype*: snout-vent: 91; tail: 52 (terminal one-third regenerated); head: 9; hind limb: 16; eye: 1; snout: 4.

REMARKS. The paratype agrees with the holotype in most of the particulars given above, as far as can be determined, the head shields being rather badly mutilated. There is a single pair of nuchals; there are 112 scales between the parietals and a line drawn at the level of the vent; the length of the hind limb goes slightly less than five times into the distance between axilla and groin. Seven lamellae beneath longest finger, two beneath the shortest, six beneath middle finger; 12 lamellae under longest toe, four under shortest, eight under middle toe. Eight scales on lateral aspect of longest toe of right foot, seven on longest toe of left foot.

The habitus of this new form suggests it is a sand-burrowing form, as are *O. tridactylus*, *O. blanfordi*, *O. raithmai*, and *O. brevipes*.

It is noteworthy that among the specimens collected by the Street Expedition to Iran are five of *O. brevipes* having the same locality data as the new species. Mr. Douglas M. Lay, a member of the expedition, provided the following information (personal communication):

"I cannot say positively whether or not these [*O. brevipes*] originated from the same habitat. However, there are no major habitat differences in the area west of Iranshahr where the specimens were taken. The widest ecologic variation there was that between an area of sand dunes south of the Bampur River and the rolling pebble desert to the north. Both of these areas were accessible to the kids who collected the specimens, but the sand dunes were between a

half mile and a mile across gravel plain' from their village, near which we camped."

It would be most curious to find these two related sand-dwelling species in the same area under the same circumstances. This matter warrants investigation by future collectors.

*Ophiomorus tridactylus* (Blyth).

(Figures 4c, 4d, 5b.)

*Sphenocephalus tridactylus* BLYTH, 1855, J. Asiatic Soc. Bengal, vol. 22, p. 654 (type locality: Afghanistan). GÜNTHER, 1864, Rept. British India, p. 98. JERDON, 1870, Proc. Asiatic Soc. Bengal, p. 74. BLANFORD, 1876, Eastern Persia, vol. 2, Zool. and Geol., p. 395.

*Ophiomorus tridactylus* BOULENGER, 1887 (in part), Cat. Lizards British Mus., vol. 3, pp. 394-395; 1887, Bull. Soc. Zool. France, vol. 12, pp. 520-523; 1889, in Aitchison, Trans. Linnaean Soc. London, Zool., vol. 5, p. 101; 1890 (in part), Fauna British India, p. 222, fig. 59. ALCOCK and FINN, 1896, J. Asiatic Soc. Bengal, vol. 65, p. 561. NIKOLSKY, 1899, Ann. Mus. Zool. Acad. Imp. Sci. St. Pétersbourg, vol. 4, p. 402. ANNANDALE, 1906, Mem. Asiatic Soc. Bengal, vol. 1, p. 197. SMITH, 1935 (in part), Fauna British India, vol. 2, p. 346, fig. 78. WERNER, 1936, Festschrift Strand, vol. 2, p. 201. CONSTABLE, 1949, Bull. Mus. Comp. Zool., Harvard, vol. 103, p. 107. LEVITON, 1959, Proc. California Acad. Sci., ser. 4, vol. 29, pp. 450-451. ANDERSON, 1963, Proc. California Acad. Sci., ser. 4, vol. 31, p. 476.

**DISTRIBUTION.** The sandy areas of the Helmand basin and adjacent regions of eastern Iran, southern Afghanistan, and northern Baluchistan, Pakistan.

**KNOWN LOCALITIES.** AFGHANISTAN (Blyth, 1855, type locality): Chaman, 30°55' N., 60°30' E. (Alcock and Finn, 1896); Chah-i-Angir, 31°41' N., 64°23' E. (Leviton, 1959); 20 miles southeast of Kandahar [3,500 ft. elevation]; Kandahar (Boulenger, 1887); Helmand (Boulenger, 1887). PAKISTAN: *Baluchistan*: Quetta, 30°12' N., 67°00' E. IRAN: *Sistan*: Nasirabad, 31°03' N., 61°25' E. (Blanford, 1876); Schile (Nikolsky, 1899); Neizar (Nikolsky, 1899); Perso-Baluch border (Annandale, 1906); 15 miles southwest of Zabol: *Zirkuch*: Chadschi-du-i-Tschagi (Nikolsky, 1899).

**MATERIAL EXAMINED** (18). CAS 84669-84675, Afghanistan: Chah-i-Angir, collected by John Gasperetti, March-September, 1950. CAS 97973, Afghanistan: 20 miles southeast of Kandahar, collected by Richard Clark, August 28, 1964. CNHM 141376, Iran: *Sistan*: 15 miles southwest of Zabol, collected by the Street Expedition to Iran, November 22, 1962. CNHM 731, "Baluchistan." AMNH 74578, 77109, Afghanistan: Dasht-i-Margo, near Chah-i-Angir. AMNH 75607-75611, Pakistan: *Baluchistan*: Quetta. MCZ 7193, "Baluchistan." collected by F. P. Maynard and A. H. McMahon.

**DIAGNOSIS.** Snout cuneiform, with sharp angular labial edge; supranasals usually narrowly in contact, partly separated from one another by the apex of the rostral; prefrontals in contact with the upper labials; frontonasal broader than long; parietal in contact with anterior temporal, postocular scale about as

large as posterior suboculars. Twenty-two scales round the middle of the body. A distinct ventrolateral edge from snout to groin. Fingers three; toes three; usually seven or eight scales on third (longest) toe.

Cream or pale brown above in preservative, uniform, or with a dorsolateral brown line on either side, from nostril, through the eye, on body, and extending onto tail, composed of more or less confluent dots on one or two rows of scales; occasionally with a few scattered dark spots on dorsum; brown dots arranged in lines on dorsal surface of tail. Dorsal surface of hind limbs with brown dots. A few dark marks on head shields present or absent. Immaculate cream below.

REMARKS. In *Ophiomorus tridactylus* the 5th and 6th supralabials are fused, forming a single large shield below the eye. Laterally, the prefrontal projects downward, being interposed between the preocular and the loreal, and forming a suture with the 3rd and 4th supralabials. In *O. brevipes* and *O. streeti* the prefrontals are smaller than in *O. tridactylus*, and do not contact the supralabials. In these two species the preocular and loreal are larger than in *O. tridactylus* and form a vertical suture with one another.

Blyth (1853), in the original description says of the color pattern: "Very pale brown, a little deeper on the upper parts." No mention is made of the lateral dark markings. All of the specimens from Iran and Afghanistan have these markings on the body.

Snout-vent length (mm.): ♂: 71-91; ♀: 76-85; dorsal scales from occipital to a point at the level of the vent: ♂: 101-114 (mean 110.9); ♀: 114-121 (mean 116.7).

The following specimens contain ovarian eggs: CAS 84670, 84672, CNHM 141376, the largest egg slightly less than 2 mm. in diameter. None of the specimens have eggs in the oviducts.

Four additional specimens, none with precise locality data, are worthy of special mention. These are: BM 68.4.3.71, "Punjab," collected by W. Theobald; BM 1936.9.11.1, "Punjab"; CNHM 731, "Baluchistan"; MCZ 7193, "Baluchistan," collected by F. P. Maynard and A. M. McMahon.

These four individuals differ from *O. tridactylus* from Afghanistan and Iran in that they are noticeably heavier bodied (fig. 6a-c) and completely lack color pattern on the body, limbs, and tail. There is a light brown line from the nostril through the eye to the temporal region, and a few faint brown markings on the median head shields.

MCZ 731 has only 20 scales round the middle of the body. Smith (1935) also records a single specimen from the Punjab with 20 scale rows. The fact that one specimen of *O. raithmai* from Las Bela, Pakistan has but 20 scale rows at mid-body, and another from Gizri, Pakistan has but 21, indicates that this character is subject to occasional variation.

These animals suggest that a distinct population, possibly inhabiting

Pakistan east of the Sulaiman Range, may be worthy of recognition when sufficient material is available. We have not been able to locate any specimens with precise or reliable data from Punjab or Rajasthan, although Jerdon (1870) states that they are common in the sandy areas of the southern and western Punjab.

*Ophiomorus tridactylus* is most closely allied to *O. raithmai* from which it differs in the color pattern, scalation of the temporal region (reflecting a greater dorsoventral compression of the skull), and longer toes (the third toe having seven or eight, rather than five or six scales). It is also related to *O. strecti*, which has fewer scales round the body (20), parietals in contact posteriorly, prefrontals separated from the supralabials, and a lineolate color pattern.

***Ophiomorus raithmai*** Anderson and Leviton, new species.<sup>9</sup>

(Figures 4e, 4f, 5c.)

*Sphenocephalus tridactylus* STOLICZKA, 1872, Proc. Asiatic Soc. Bengal, pp. 76 and 88. THEOBALD, 1876 (in part), Cat. Rept. British India, p. 70. BLANFORD, 1879 (in part), J. Asiatic Soc. Bengal, vol. 48, p. 128. MURRAY, 1884, Vertebrate Zoology of Sind, p. 356. *Ophiomorus tridactylus* BOULENGER, 1887 (in part), Cat. Lizards British Mus., vol. 3, pp. 394-395; 1887, Bull. Soc. Zool. France, vol. 12, pp. 520-523; 1890 (in part), Fauna British India, p. 222. SMITH, 1935 (in part), Fauna British India, vol. 2, p. 346. MINTON, 1962, American Mus. Novitates, no. 2081, pp. 11 and 37, fig. 41.

**DISTRIBUTION.** The sandy tracts of southern and eastern West Pakistan; northwestern India.

**KNOWN LOCALITIES.** INDIA: Kachh, between the eastern branches of the Indus River and Kathiwar (Stoliczka, 1872). PAKISTAN: *Sind*: along right bank of Indus River, between Karachi and Sakkar (Stoliczka, 1872); *Karachi District*: Karachi, 24°52' N., 67°03' E.; Ghizri, 24°49' N., 67°03' E., near Clifton; Malir Cantonment North, 24°56' N., 67°12' E.; *Dadu District*: Canyon of Sari River, 23 miles northeast of Malir; *Sanghar District*: 0.5 miles west of Burra; *Las Bela District*: Sonmiani Beach, 25°26' N., 66°36' E.

**HOLOTYPE.** California Academy of Sciences 99834, adult male, Pakistan: Karachi District: Ghizri, collected by Jeromie A. Anderson, March 24, 1965.

**PARATYPES** (26). CAS 99835-99836, 99838, 99840-99846. MCZ 84027. ZIL (catalog number unavailable, formerly CAS 99837), Pakistan: Karachi District: Ghizri, collected by J. A. Anderson, March 24, 1965. AMNH 82205. Pakistan: Karachi District: Karachi, east edge of city, near Hill Park, collected by Mary April and Sherman A. Minton, July 10, 1959. AMNH 86876. Pakistan: Karachi District: Karachi, Jinnah Hospital, collected by Sherman

<sup>9</sup> From *raith mai*, sand-fish, a term used for this lizard by the Sindhis and some of the neighboring Baluchis in the region in which it occurs (Jeromie A. Anderson, personal communication).

A. Minton, June 29, 1961. AMNH 86877-86879, Pakistan: Karachi District: Ghizri, near Clifton, collected by Jeromie A. Anderson, June 28, 1961. AMNH 86880, Pakistan: Karachi District: Malir Cantonment North, collected by Madge and Sherman Minton, June 22, 1961. AMNH 85843, Pakistan: Dadu District: Canyon of Sari River, 23 miles northeast of Malir, collected by Minton and Feffer, February 19, 1961. AMNH 85844, Pakistan: Sanghar District: 0.5 miles west of Burra, collected by Sid, Mike, and Clarence Gulik and Sherman Minton, March 31, 1961. AMNH 85845-85848, Pakistan: Las Bela District: Sonmiani Beach, collected by Sherman A. Minton and family, February 12, 1961. BM 1934.3.4.3, 1934.3.4.4, Pakistan: Sind (Bombay Natural History Society).

DIAGNOSIS. Snout cuneiform, with sharp angular labial edge; supranasals usually narrowly in contact, partly separated from one another by the apex of the rostral; prefrontals in contact with the upper labials; frontonasal broader than long; parietal not in contact with anterior temporal (posterior temporal intervenes); postocular scale much larger than posterior suboculars. Twenty-two scales round the middle of the body. A distinct ventrolateral edge from snout to groin. Fingers three; toes three. Usually four to six scales on third (longest) toe.

In life the dorsal surfaces are pale brown, many specimens being suffused with yellow ochre. This ochre color is most intense at the upper center of each scale, in the region in which the dark brown spots occur.

Cream or pale brown above in preservative, each of the eight or 10 dorsal and dorsolateral longitudinal scale rows having a dark brown line composed of discrete dots extending from the nape to the level of the hind limbs, reducing to six or eight lines on the tail. Dorsal surface of hind limbs with brown dots. A dark brown line from nostril through eye, across temporal region. Dark brown markings on the median head shields. Immaculate cream or tan below.

DESCRIPTION OF HOLOTYPE. Head depressed, snout cuneiform with a sharp angular labial edge; mouth inferior. Rostral with a triangular, convex, superior portion equal in length to two-thirds the width, the inferior portion flat, lying entirely in front of the mouth, and equal in length to about one-half the width; the posterior angle of the rostral partially separates the supranasals, which are in contact for approximately one-fourth their total length; frontonasal septagonal, about two-thirds as long as broad, as long as the superior portion of the rostral; frontal slightly broader than long, tensesided, longer than the distance between its anterior border and the apex of the rostral, but shorter than the distance between its anterior border and the tip of the snout; interparietal slightly broader than long, slightly shorter than the frontal, and as broad as the frontal, its straight anterior border forming a broad suture with the straight posterior border of the frontal; the

elongate, obliquely situated parietals are about twice as long as broad, and do not meet behind the interparietal; the anterior scales of the first two dorsal scale rows on either side of the midline are fused to form two nuchal shields, just posterior to the interparietal. Nostril in the suture between the nasal and the supranasal, narrowly separated from the rostral; nasal slightly longer than supranasal, twice as long as high; supranasal slightly longer than broad; prefrontals five-sided, acutely pointed behind, longer than broad, interposed between the loreal and the preocular, and broadly in contact with the supralabials (with the 4th supralabial on the right, the 3rd and 4th on the left side), broadly separated from one another by the suture formed by the frontal and frontonasal; loreal higher than long, as high as the preocular, which is slightly longer than high; three small supraoculars, the anterior two larger than the posterior; two small frontoparietals, widely separated from one another, pentagonal, and less than twice as long as the postocular; five small, elongate supraciliaries on the right, four on the left; upper eyelid rudimentary; lower lid with a large transparent scale and seven much smaller scales on the right side, nine on the left side of head; four small suboculars on the right, five on the left; a single postocular, much larger than the posterior suboculars, positioned in such a way that the anterior temporal fails to contact the parietal; two large temporals, the posterior largest, anterior in contact with 5th and 6th upper labials, postsubocular, postocular, posterior temporal, and an enlarged scale lying between the 6th upper labial and posterior temporal; the posterior temporal forms a broad suture with the parietal. Six supralabials, increasing in size from the 1st to the 5th, the 6th much smaller than 5th. No external ear opening.

Mental quadrangular, anterior border convex, posterior border concave; two azygous postmentals, the posterior much the larger; a series of four enlarged shields on either side of the chin, bordering the infralabials. Six infralabials.

Body very elongate, with distinct ventrolateral edge, which continues the labial angulation to the groin (this edge present in living as well as preserved specimens). Length of hind limb goes slightly more than four times into distance between axilla and groin. All scales of body perfectly smooth, imbricate, broader than long, the two midventral rows narrower than adjacent rows. Twenty-two longitudinal, straight series of scales round the middle of the body; 107 dorsal scales between posterior margin of the interparietal and a point at the level of the vent. Four enlarged preanal scales, the mid-ventral pair largest.

Tail slightly depressed, subcircular in cross section, scales about one and one-half times wider than those of body; a median subcaudal series of slightly enlarged scales.

Forelimb less than one-half length of hind limb, three fingers, the one on

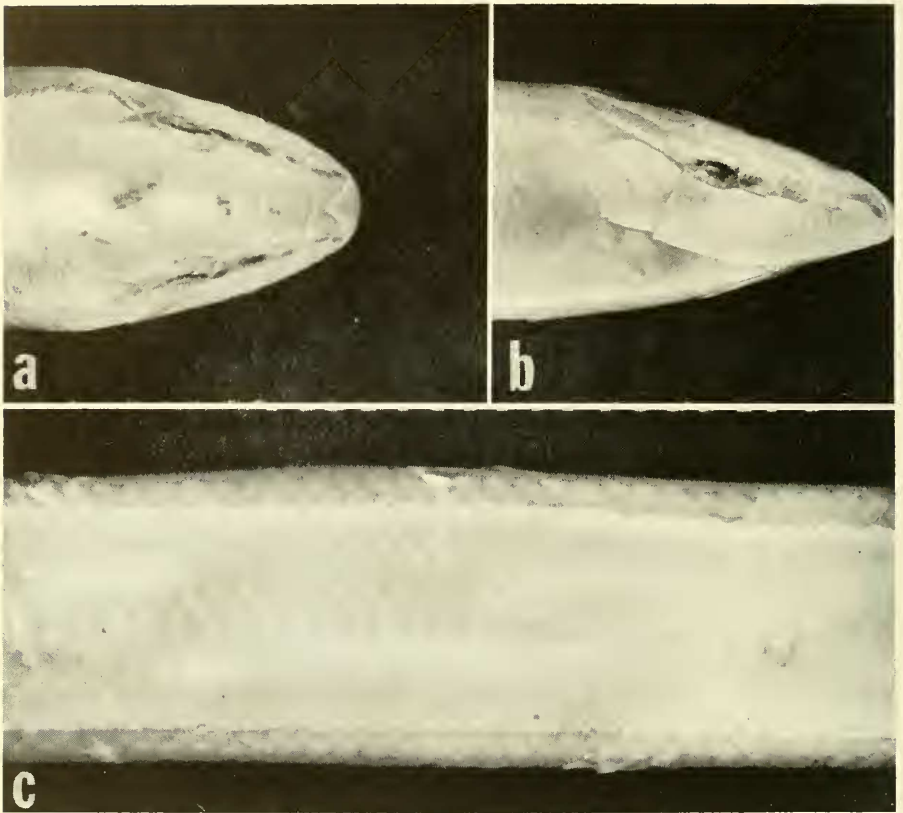


FIGURE 6. *Ophiomorus tridactylus* from the Punjab, India.

the radial side shortest, that of the ulnar side slightly shorter than the middle finger; two scales on the lateral aspect of the two longest fingers, one on the shortest.

Three toes, the toe of the tibial side shortest, about two-thirds the length of the toe of the fibular side, which is longer than the middle toe. Lateral aspect of longest toe with four scales, middle toe with three, shortest toe with two. All fingers and toes clawed.

Hemipenes: In the holotype, both hemipenes are everted, the left more fully than the right. The two organs are mirror images of one another. The everted organ is five mm. in length, or equal to nine subcaudal scales. The hemipenis is bilobed and bulbous, the sulcus spermaticus is simple, with prominent, thick lips, appearing basally on the posterior side of the everted organ, traversing the lateral aspect of the apical portion obliquely, and ascending the apical portion vertically to its termination midway between the termination of the basal portion and the apex of the organ. The hemispherical lobes are



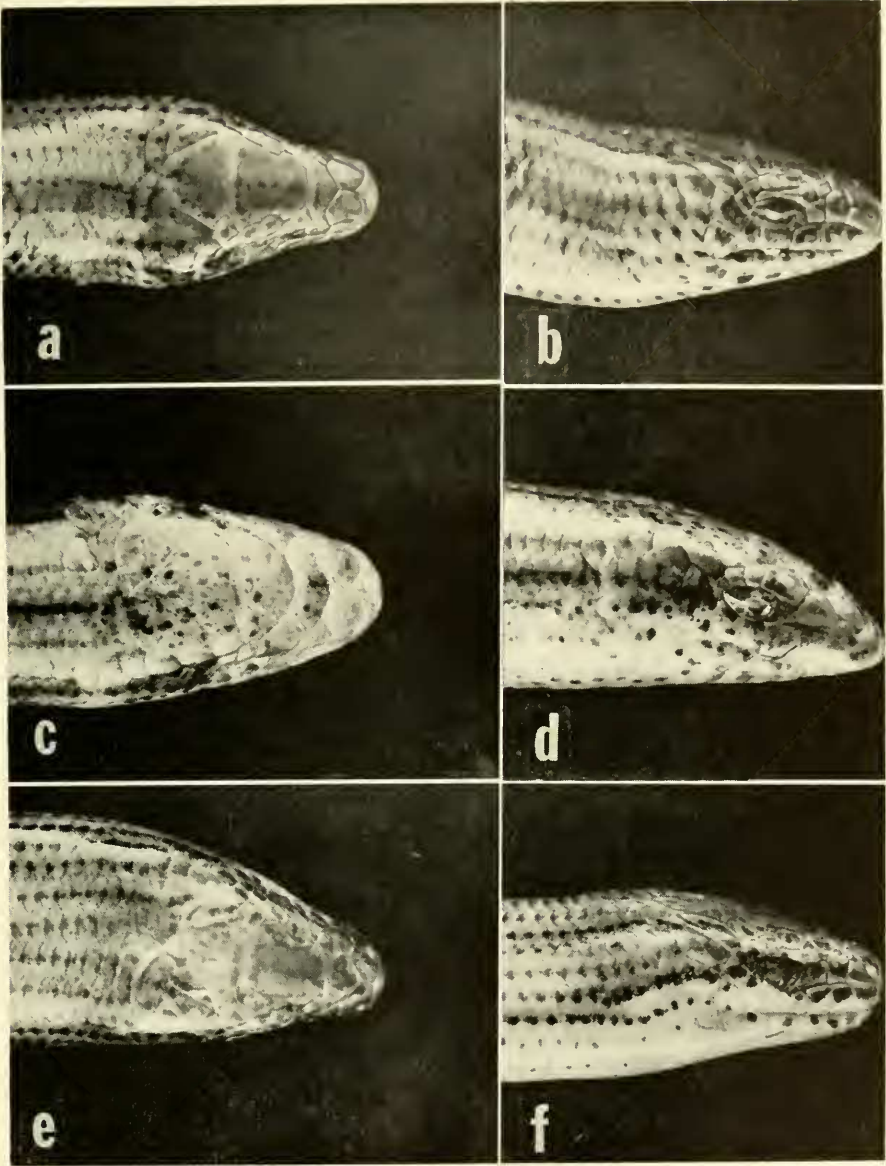


FIGURE 7. "Punctatissimus" group of the genus *Ophiomorus*; dorsal and lateral views of head: a and b) *O. punctatissimus*; c and d) *O. la'astii*; e and f) *O. persicus*.

ornamented with smooth, vertically oriented ridges, running from the shallow groove between the lobes to the base of each lobe. The basal portion of the organ is cylindrical and naked, constituting about half the total length of the hemipenis.

Color (in alcohol) light brown above, nearly every scale of the eight dorsal rows with a dark brown spot, those of the mid-dorsal rows largest, forming eight longitudinal lines of discrete spots extending from the posterior head shields to level of groin. Six lines of spots on tail. Venter and sides immaculate white. Upper surface of hind limb with scattered dark brown dots. Forelimbs unspotted. Dark brown markings on supranasals, nasals, loreals, frontonasal, prefrontals, preoculars, frontal, frontoparietals, interparietal, parietals, temporals; a broken dark brown line from nostril through eye, onto temporal region. Dorsum of body and tail suffused with yellow in life, the yellow color concentrated in the areas surrounding the dark spots.

MEASUREMENTS OF HOLOTYPE (in mm.). Snout-vent: 83; tail: 59 (terminal one-fifth regenerated); head (tip of snout to angle of jaw): 8; hind limb: 14; eye (opening between lids): 1; snout (tip of snout to orbit): 5.

REMARKS. Of the 27 examples examined, a single specimen (AM 85847) has 20, rather than 22 scales round the middle of the body and another (CAS 99843) has 21 due to fusion of two lateral rows on one side for a short distance; there is a subsequent reduction to 20 rows in the posterior half of the body. A specimen reported by Stoliczka (1872) from Kachh is stated to have 20 scale rows at mid-body. Stoliczka's description agrees in general with the material at hand. However, he does not mention the prefrontal being in contact with the upper labials, and thus the description would fit *Ophiomorus streeti* equally well. Considering the locality of his material, and in absence of evidence to the contrary, it is assumed that the Kachh specimen (or specimens?) is *O. raithmai*.

Boulenger (1887a, 1887b) and Smith (1935), in discussing *O. tridactylus*, include material from Cutch and Sind, and also from the Punjab. Both workers state that the color pattern may be uniform cream or pale brown, or with longitudinal series of brown dots on the back. It is apparent that the material they examined included *O. raithmai*.

Four specimens in the British Museum (70.11.29.39, 39A, 39B, 39C) collected by T. C. Jerdon and said to come from Punjab agree with *O. raithmai* in scalation of head and body. The longest toe has seven scales on the lateral aspect, however. The dorsal pattern of dark spots linearly arranged is faint and much reduced in these specimens, the spots being scattered on the eight dorsal scale rows. These specimens may represent a distinct population in the sandy regions east of the Indus River. Without precise locality data it is impossible to evaluate these four individuals. The eastern limits of the genus *Ophiomorus* are in much need of investigation.

Snout-vent length (mm.): ♂: 64-85; ♀: 63-99; dorsal scales from occipital to a point at the level of the vent: ♂: 102-110 (mean 105.4; ♀: 110-114 (mean 111.8).

The following specimens contain ovarian eggs: BM 1934.3.4.3, 1934.3.4.4, AMNH 85847, 86876, 86880, the largest egg slightly less than 2 mm. in diameter. None of the specimens have eggs in the oviducts.

There has been some question as to whether the lower eyelid, although not fused with the upper, was movable or immovable (Smith, 1935). In the living animal it is readily observed that the eye can be opened completely.

In retaining the lineolate color pattern and in the scalation of the temporal region, *O. raithmai* appears to be less specialized than *O. tridactylus*, to which it is closely related. The toes are shorter than in *O. tridactylus*, however.

#### PUNCTATISSIMUS GROUP

### *Ophiomorus punctatissimus* (Bibron and Bory de St. Vincent).

(Figures 7a, 7b, 8a.)

*Anguis punctatissimus* BIBRON and BORY DE ST. VINCENT, 1833, Exped. Sci. Morée, Rept., p. 71, pl. 11, fig. 5 (type locality: Greece: Morea). GERVAIS, 1836, Ann. Sci. Nat., vol. 6, p. 310.

*Ophiomorus miliaris* DUMÉRIL and BIBRON, 1839, Erp. Gén., vol. 5, p. 799. BONAPARTE, 1841, Faun. Ital., vol. 30. GRAY, 1845, Cat. Lizards, p. 121. STRAUCH, 1862, Mém. Acad. Imp. Sci. St. Pétersbourg, ser. 7, vol. 14, p. 46. DE BETTA, 1868, Atti Ist. Venice, ser. 3, vol. 13, p. 915. SCHREIBER, 1875, Herp. Europa, pp. 338-339. BOETTGER, 1876, Berlin Offenb. Ver. Naturk., vol. 15/16, p. 57. BEDRIAGA, 1882, Bull. Soc. Nat. Moscou, vol. 61, p. 51.

*Ophiomorus punctatissimus* BOULENGER, 1887, Cat. Lizards British Mus., vol. 3, p. 397; 1887, Bull. Soc. Zool. France, vol. 12, pp. 528-533. SCHREIBER, 1912, Herp. Europa, p. 329, fig. 65; NIKOLSKY, 1915, Fauna de la Russie, vol. 1, p. 518. WERNER, 1930, Occ. Pap. Mus. Zool. Univ. Michigan, p. 19, pl. 6, fig. 29. MERTENS and MÜLLER, 1940, Abh. Senckenberg Naturf. Ges., vol. 451, p. 48. HELLMICH, 1956, Die Lurche und Kriechtiere Europas, p. 128. MERTENS and WERMUTH, 1960, Amph. Rept. Europas, pp. 162-163. HELLMICH, 1962, Reptiles and Amphibians of Europe, p. 123.

DISTRIBUTION. Mainland Greece; southwestern Turkey.

KNOWN LOCALITIES. GREECE: Morea (Peloponnesus) (Bibron and Bory de St. Vincent, 1883, type locality); Peloponnesus (Schreiber, 1912); Larissa (Werner, 1930); Thessaly (Werner, 1930); Acro-Corinth (Werner, 1930); Peloponnesus: Taygetos. TURKEY: Xanthus (Boulenger, 1887).

MATERIAL EXAMINED (6). CAS 12752, Greece: Morea. MCZ 25933, and USNM 31956, 37299, Greece: Peloponnesus: Taygetos. AMNH 17819, Turkey: Xanthus. MCZ 38517, Greece: Corinth.

DIAGNOSIS. Snout obtuse, rounded, rostral scarcely projecting beyond lip; prefrontals present; supranasals broadly in contact, not partly separated from one another by the apex of the rostral. Eighteen scales round the middle of the body. Limbs lacking.

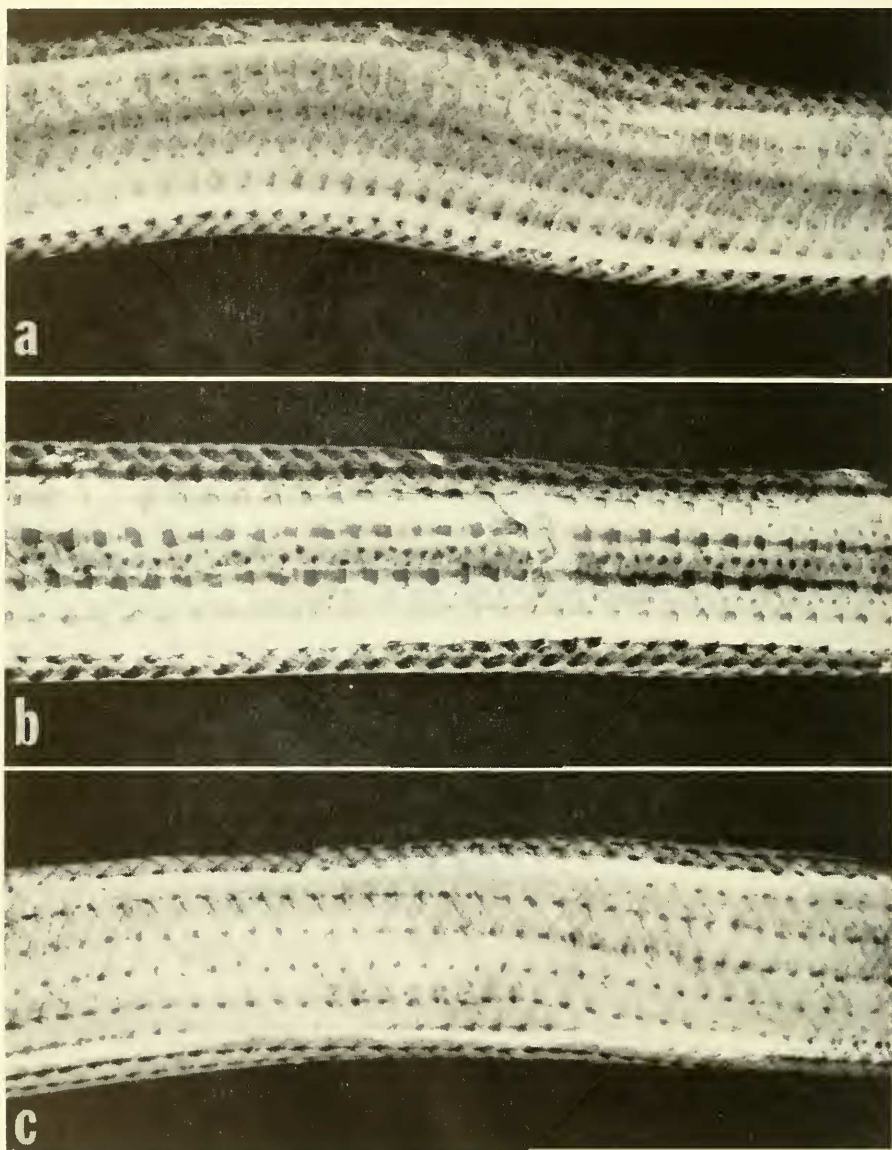


FIGURE 8. "*Punctatissimus*" group of the genus *Ophiomorus*; mid-body sections showing typical color patterns: a) *O. punctatissimus*; b) *O. latastii*; c) *O. persicus*.

Cream above in preservative, the four median dorsal scale rows of body without dark markings or with four faint dark lines. A broad brown lateral stripe extending from nostril to tip of tail, three scale rows wide on body, and

involving four scale rows. Five brown lines on the venter, from chin to end of tail. Dorsum of tail with four narrow brown lines.

REMARKS. *Xanthus* is apparently the only recorded locality for Turkey; all other localities are in mainland Greece. The single specimen examined here from *Xanthus* is indistinguishable from those from Greece.

MCZ 25933 has 20 scale rows at midbody, the reduction to 18 taking place just posterior to this point.

This species has been collected under rocks (Schreiber, 1912; Werner, 1930; Hellmich, 1956).

Snout-vent length (mm.): ♂: 53-77; ♀: 50; dorsal scale rows from occipital region to a point at the level of the vent: ♂: 102-107 (mean 104); ♀: 113.

CAS 12752 contains ovarian eggs, the largest less than 1 mm. in diameter.

### *Ophiomorus latastii* Boulenger.

(Figures 7c, 7d, 8b.)

*Ophiomorus miliaris* (nec Duméril and Bibron) GÜNTHER, 1864, Proc. Zool. Soc. London, p. 488.

*Ophiomorus latastii* BOULENGER, 1887, Cat. Lizards British Mus., vol. 3, p. 398, pl. 33, fig. 2 (type locality: Palestine: Mt. Hermon); 1887, Bull. Soc. Zool. France, vol. 12, pp. 533-534. HAAS, 1951, Bull. Res. Council Israel, vol. 1, pp. 75-76.

DISTRIBUTION. Lebanon; Israel; Jordan. Upper and Lower Galilee and the Jordan Valley (Haas, 1951).

KNOWN LOCALITIES. LEBANON: Mt. Hermon (Günther, 1864, type locality). ISRAEL: Mt. Carmel (Haas, 1951); Mt. Gilboa (Tirat Zvi) (Haas, 1951); Ein Hamifratz. JORDAN: Waid Heidan, east of the Dead Sea (Haas, 1951).

MATERIAL EXAMINED (3). CAS 87417, Palestine. CNHM 74419, no data. AMNH 88382, Israel: Ein Hamifratz.

DIAGNOSIS. Snout acutely conical, a slight labial edge; rostral projects beyond lip; no prefrontals; supranasals narrowly in contact, partly separated from one another anteriorly by the apex of the rostral. Sixteen scale rows round the middle of the body. Limbs lacking.

Cream above in preservative, each scale of body and tail with a dark brown spot, these spots being more or less confluent, forming longitudinal dark lines on the dorsum and sides, running the length of body and tail. Two stripes on either side, much broader than those on the dorsum, and narrowly separated. Lines of discrete brown dots on all ventral surfaces. A brown line from rostral through the eye and temporal region, becoming confluent with the two broad lateral stripes. Lips and top of head with scattered brown dots.

REMARKS. *Ophiomorus latastii* is the most specialized of the three western

species as regards the head shields. The prefrontals are absent, apparently as a result of fusion with the first supraocular. The loreal is larger, and the perocular smaller than in any other species of the genus, and the rostral larger, wider, and more projecting than in either *O. persicus* or *O. punctatissimus*.

The color pattern is the least specialized of any member of the genus, in that each scale of the body has a dark marking, confluent as longitudinal stripes on all scale rows except on the belly, where they form lines of discrete dots.

AMNH 88382 contains ovarian eggs, the largest approximately 2 mm. in diameter.

*Ophiomorus persicus* (Steindachner).

(Figures 7c, 7f, 8c.)

*Hemipodion persicum* STEINDACHNER, 1867, Sitzb. Akad. Wiss. Wien, vol. 55, p. 265, pl. 1 (type locality: Persia; here restricted to Iran: Fars Province: 5 kilometers southeast of Pol-i-Abgineh, approximately 29°33' N., 51°46' E.<sup>30</sup>). BLANFORD, 1876, Eastern Persia, vol. 2, Zool. and Geol., p. 394.

*Ophiomorus persicus* BOULENGER, 1887, Cat. Lizards British Mus., vol. 3, pp. 396-397; 1887, Bull. Soc. Zool. France, vol. 12, pp. 526-528. NIKOLSKY, 1915, Faune de la Russie, vol. 1, p. 516. WERNER, 1936, Festschrift Strand, vol. 2, p. 201. ANDERSON, 1963, Proc. California Acad. Sci., ser. 4, vol. 31, p. 476.

DISTRIBUTION. Western slopes of Zagros Mountains in southwestern Iran.

MATERIAL EXAMINED (18). CNHM 141555-141565, 141576-141582, Iran: Fars Province: 5 kilometers southeast of Pol-i-Abgineh, Collected by W. S. Street, J. K. Street, and D. M. Lay, January 1-4, 1963.

DIAGNOSIS. Snout obtuse, rounded, the rostral scarcely projecting beyond lip; 20 scales round the middle of the body. Fingers three; toes two.

Cream or light brown above in preservative, each dorsal and lateral scale with a brown spot, these more or less confluent to form lines the length of the body. These dark lines are distinct on the sides, the four median lines being much paler. The dots are not confluent on the tail. The ventral surface of the body is cream or tan, the four ventral rows of scales free of dark spots. All scales of tail possess a dark spot. A brown line from nostril through eye, onto temporal region; upper surface of head mottled with brown.

REMARKS. In form and color pattern *Ophiomorus persicus* most closely resembles *O. punctatissimus*, undoubtedly its closest living relative. In addition to the presence of small limbs, it differs from *O. punctatissimus* in the absence of any external ear opening, and the snout, which is slightly more

<sup>30</sup>The specimen in the British Museum from the type series collected by F. Kotschy in 1845 is labeled "Kurdistan." Since the name Kurdistan is applied to several widely separated regions in Iran, the type locality cannot be determined. The specimens collected by the Street Expedition to Iran constitute the second record for the species, and are from one of the regions sometimes referred to as Kurdistan (see United States Board on Geographic Names, 1956, Gazetteer number 19, Iran, pp. 305 and 314).

blunt. As in the other two western members of the genus, there is some dark pigmentation of the peritoneum and the mesenteries investing the digestive tract.

While it is extremely doubtful that *O. persicus* itself could have given rise to any of the other living species of the genus, it occupies the central position in the group geographically, as well as with respect to the adaptive trends observed in these lizards.

In *O. punctatissimus* and *O. latastii* there have been modifications of the skull and head scalation, apparently in relation to burrowing habits, just as the eastern members of the genus have independently undergone even more drastic modification in these structures. *Ophiomorus persicus* shows little specialization in this regard, and most likely is representative of the ancestral skull form. *Ophiomorus persicus* is intermediate in the reduction of the limbs, the sand-inhabiting species having the least limb reduction, while the two westernmost species have lost all external vestiges of limbs. In number of longitudinal scale rows *O. persicus* is also intermediate. It shares the lack of external ear opening with the eastern species, however.

Snout-vent length (mm.): ♂: 56-69; ♀: 73-82; dorsal scales from occipital region to a point at the level of the vent: ♂: 112-117 (mean 114.3); ♀: 118-124 (mean 120.8). Thus there seems to be strong sexual dimorphism in size as well as number of dorsal scale rows in this species.

The following specimens contain ovarian eggs: CNHM 141555, 141557, 141558, 141560, 141561, 141565, 141579. The largest egg is slightly less than 2 mm. in diameter.

#### DISCUSSION

The genus *Ophiomorus* is composed of nine species as recognized here. The genus is distributed from Greece through southwest Asia to northwestern India. None of the species have been collected in eastern Turkey, Syria, Iraq, or northern Iran. This apparent hiatus in their distribution may be due in part to their secretive habits. Collection records are few for the entire genus.

*Ophiomorus chernovi* is known from a single locality, Pul-i-Khatun, Turkmen, USSR, several hundred miles north of the nearest Iranian record for the genus. The westernmost record for *O. blanfordi* lies several hundred miles west of the two other known localities for this form. All three localities are either known or presumed to be coastal dune areas.

*Ophiomorus punctatissimus* is apparently known outside of mainland Greece only from Xanthus, in southwestern Turkey. Obviously, much more collecting is required before the limits of distribution can be established for any of these forms.

While little is known of the habits of these animals, they fall into two groups from the standpoint of habitat selection as well as morphology. The

eastern forms, *O. brevipes*, *O. chernovi*, *O. blanfordi*, *O. streeti*, *O. tridactylus*, and *O. raithmai*, are sand-burrowers, and their morphological adaptation to this mode of life is at once apparent. The least specialized of the sand-dwelling forms is *O. chernovi*, with 24 scale rows, the snout being very slightly less wedge-shaped than any of the others. It has four fingers, as do *O. brevipes* and *O. blanfordi*. The three-fingered species have the most sharply acuminate snouts, *O. tridactylus* and *O. raithmai* having the greatest degree of fusion of the head shields, but retaining 22 scale rows, while *O. streeti* has only 20. From the standpoint of color pattern, *O. streeti* and *O. raithmai* are the least specialized, while *O. tridactylus* has lost the dark pattern almost completely.

The three western species have been collected under rocks, and do not live in areas of wind-blown sand. The tendency to limb reduction finds its extreme in these species. Least specialized of the three is *O. persicus*, also the most central in the distribution of the genus. It has an obtuse, rounded snout, possesses limbs, but with only three fingers and two toes, and has 20 scale rows round the body. The most specialized of this group is *O. latastii*, with only 16 scale rows round the body. In this species the prefrontals have apparently fused with the first supraoculars, and the snout is acutely conical. This form possesses a color pattern that is probably closest to the ancestral type, however, each scale of the body and tail bearing a dark spot, these arranged to form lines the length of body and tail.

Both of the limbless species, *O. latastii* and *O. punctatissimus*, have external ear openings, a curious fact, since *O. persicus*, in many ways the least specialized of the genus, lacks external ear openings, as do the sand-dwelling species.

Dark pigment is present in the peritoneum and the mesenteries investing the digestive tract in all of the three western species. The pigmentation is heaviest in *O. persicus*. In the sand-dwelling species the peritoneum and mesenteries are devoid of dark pigment. If this pigmentation has a role in the animals' thermal relations to the environment, the basic habitat differences are undoubtedly reflected here. Subsurface sand dune temperatures are relatively static, while the microhabitat under rocks, or in burrows where there is air circulation, may exhibit considerable fluctuation of temperature.

Taxonomic recognition of the two major groups of the genus as presently constituted would certainly be justified, placing the dune-dwelling species in the genus or subgenus *Zygnopsis* Blanford. Because *Ophiomorus persicus* appears to link the two groups in some morphological respects, and since a study of the intergeneric relationships of the skinks of southwest Asia is contemplated, we have not separated the two radiations into separate taxa here.

The morphology of these lizards, as well as their distribution, invites speculation as to their evolutionary history. A hypothetical ancestral form would be expected to have 24 scale rows round the body, a rounded, conical snout, external ear openings, at least four fingers and three toes, and a dorsal



and lateral pattern of dark brown longitudinal stripes or linearly arranged dots involving all of the scale rows of the elongate body. Such a form might have existed in the area which is now the Central Plateau of Iran and upland areas of Iran and contiguous country at a time when this region had a climate supporting a more or less continuously distributed savannah or grassland vegetation type.

With the breakup in the continuity of this habitat, possibly coincident with increased orogeny in the western portion of the region, one line of specialization resulted in the legless western species occupying an upland, under-rock habitat. With increasing aridity and further fragmentation of the environment of the Central Plateau of Iran, a line of specialization adapted to live in the windblown sand took place.

*Wind as an agent of distribution of Ophiomorus.* The morphological specialization of the eastern species has been directional, in a geographic sense, from north to south and west to east. The four-fingered forms have not been collected east of the Iranian border (with the exception of a record for *Ophiomorus blanfordi* 10 miles east of the border). The least specialized of these forms is the most northern while the southernmost is the most highly modified. Of the three-fingered forms, *O. streeti*, the least specialized as regards head shields and color pattern, is found farthest west; the other two forms occur to the east of the Iranian Plateau, and there is a suggestion, based on insufficient material, that even more highly modified populations exist to the east of these.

This distribution suggests that the dune-inhabiting forms originated on the northern Iranian Plateau, increasingly modified populations subsequently becoming distributed southward and eastward. Since these animals are obligate dune dwellers, they are dependent on the progressive movement of the sand for their distribution.

We are indebted to Mr. Adrian H. Gordon of the United Nations Technical Assistance Board and Special Fund in Tehran for the following information on surface winds in eastern Iran:

During the cold months the area is under the influence of the Siberian Anticyclone. A strong northeasterly stream of air moves over parts of the Iranian Plateau in the winter. Frequently, however, relatively warm, moist air masses from the Mediterranean break through the plateau.

In the summer the Iranian winds are dominated by the Indian monsoon system, but since higher pressure prevails to the north at all seasons (northeast in winter and northwest in summer), there is no reversal of wind directions from winter to summer in Iran. The low pressure area of India and Pakistan in summer influences the entire Middle East, and winds generally blow toward this low center in all sections. Over most of the Iranian Plateau the wind direction is more or less from the north or northwest, but the actual direction of local winds is modified by topography. On the eastern borders of Iran, particularly in Seistan, north to northwest winds (the "Bad-i-Sad-o-Bist-Roz" or

"Wind of 120 days") blow from May to September from the northwest with great regularity, steadiness, and sometimes violence; the direction appears to be fairly constant. These winds are said to reach 40 or 50 knots, with gusts of 60 to 70 knots. This is a powerful erosive force, driving clouds of dust and gravel before it, and in ruined cities of the region, all walls built at right angles to the direction of wind have been demolished. [Adrian H. Gordon, *in litt.*]

The sand-living populations of *Ophiomorus* recognized in this review are apparently isolated from one another by physical barriers to the distribution of the dunes in which they live. *O. tridactylus* is isolated from *O. raithmai* by the Kirthar Range and the rugged broken terrain of Baluchistan. The Sulaiman Range may isolate the Afghanistan population from populations of *O. tridactylus* in the Thar Desert of Rajasthan and the Punjab. *Ophiomorus raithmai*, the coastal Pakistan population, is found west of the Indus River, possibly isolated from recognizably distinct populations east of the Indus.

These populations are somewhat analogous to island populations in their isolation from one another. Contact between populations can be reestablished only as the agency of wind in conjunction with changing landforms brings existing dune areas into contact. Thus, while geographic isolation may be relatively transitory, immediate genetic isolation can be assumed to be complete. Small populations of considerable genetic and phenotypic stability would be expected, and the evidence from the admittedly small amount of material at hand is not inconsistent with this hypothesis.

*Ophiomorus* and the related genera, *Chalcides* and *Scincus*, may have arisen from a *Eumeces*-like forebear. The relationships among these genera are in need of investigation before any more meaningful speculation can be made. Perhaps worthy of note is the fact that there is little overlap in the distribution of *Ophiomorus* with either *Chalcides* or *Scincus*.

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